METHYL HYDRAZINE

Methyl hydrazine is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 60-34-4 CH_3NHNH_2

Molecular Formula: CH_6N_2

Methyl hydrazine is a clear liquid with a fishy odor. It is soluble with water, hydrazine, low molecular weight monohydric alcohols, and hydrocarbons. Methyl hydrazine ignites spontaneously on contact with strong oxidizing agents such as chlorine trifluoride, fluorine, nitrogen tetroxide, and fuming nitric acid (Merck, 1983).

Physical Properties of Methyl Hydrazine

Synonyms: monomethylhydrazine; MMH; hydrazomethane; 1-methylhydrazine

Molecular Weight:	46.07
Boiling Point:	87.5 ^oC
Melting Point:	-52.4 ^oC
Flash Point:	26.6 ^oC (70 ^oF) open cup
Vapor Density:	1.6 (air = 1)
Density/Specific Gravity:	0.874 at 25/4 ^oC (water = 1)
Vapor Pressure:	49.6 mm Hg at 25 ^oC
Log Octanol/Water Partition Coefficient:	-1.50
Conversion Factor:	1 ppm = 1.88 mg/m^3

(HSDB, 1991; Merck, 1983; Sax, 1989)

SOURCES AND EMISSIONS

A. Sources

Methyl hydrazine is used as a chemical intermediate, a solvent, and as a missile propellant (HSDB, 1991).

B. Emissions

No emissions of methyl hydrazine from stationary sources in California were reported, based on data obtained from the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Methyl hydrazine has been found in an edible mushroom, Gyrimitia esculenta (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of methyl hydrazine.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of methyl hydrazine was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Methyl hydrazine exists in the atmosphere in the gas phase. The dominant atmospheric loss processes for methyl hydrazine are reaction with the hydroxyl (OH) radical and with ozone (O_3). The calculated half-life and lifetime of methyl hydrazine due to reaction with the OH radical are 3.7 hours and 5.3 hours, respectively (Atkinson, 1989). The reaction with O_3 is fast, with a lower limit to the rate constant (Atkinson and Carter, 1984), leading to a calculated half-life and lifetime of methyl hydrazine due to reaction with O_3 of less than 17 minutes and 25 minutes, respectively, for an average O_3 concentration of 30 part per billion. Clearly, the ozone reaction is calculated to dominate, leading to a short half-life and lifetime for methyl hydrazine in the atmosphere (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Methyl hydrazine emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to methyl hydrazine are inhalation, ingestion, and dermal contact.

Non-Cancer: Methyl hydrazine is a central nervous system convulsant, a potent hemolysin, highly hepatotoxic, and causes methemoglobinemia. It is corrosive and extremely irritating to the eyes, skin, and respiratory tract. Acute inhalation exposure in humans may result in headache, vomiting, diarrhea, ataxia, anoxia, cyanosis, tremors, and convulsions. Damage to the liver and kidneys may also occur. Ingestion of poisonous mushrooms containing methyl hydrazine has caused fatal hepatic necrosis in humans. In animals, chronic inhalation exposure to

methyl hydrazine has been observed to cause adverse effects on the central nervous system, kidney, liver, blood and spleen (U.S. EPA, 1994a).

The Reference Concentration (RfC) is under review by the United States Environmental Protection Agency (U.S. EPA), and an oral Reference Dose (RfD) has not been set (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects of methyl hydrazine in humans. No malformations in offspring of rats orally exposed to methyl hydrazine were observed; however, malformations were reported in toads (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of methyl hydrazine in humans. In one study, an increase in tumors of the liver and cecum were observed in hamsters exposed to methyl hydrazine in drinking water. The U.S. EPA has classified methyl hydrazine in Group B2: Probable human carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has not classified methyl hydrazine for human carcinogenicity (IARC, 1987a). The State of California has determined under Proposition 65 that methyl hydrazine and its salts are carcinogens (CCR, 1996).